Docket No.: RIC980T4P1   Appln No.: 09/778,186

le: Method and System for Evaluating the Quality
             of Packet-Switched Voice Signals

Inventors: W. Hardy

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FIG. 1(a)

FIG. 1(b)

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FIG. 2

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FIG. 3A

FIG. 3B

FIG. 3C

Method and System for Evaluating the Quality
of Packet-Switched Voice Signals
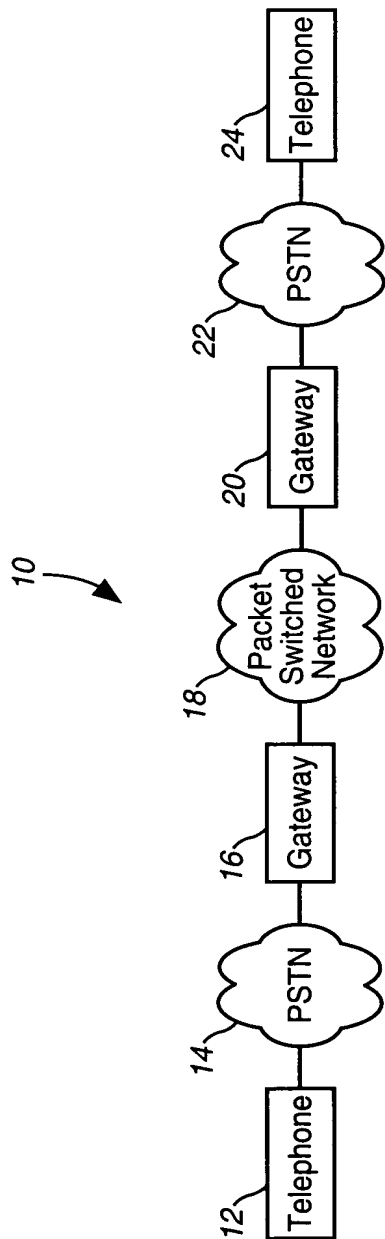
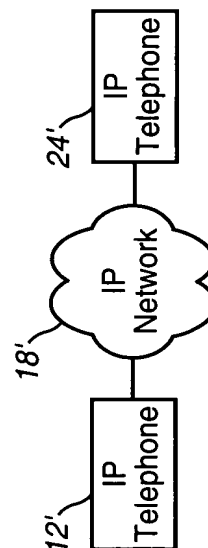Inventors: W. Hardy

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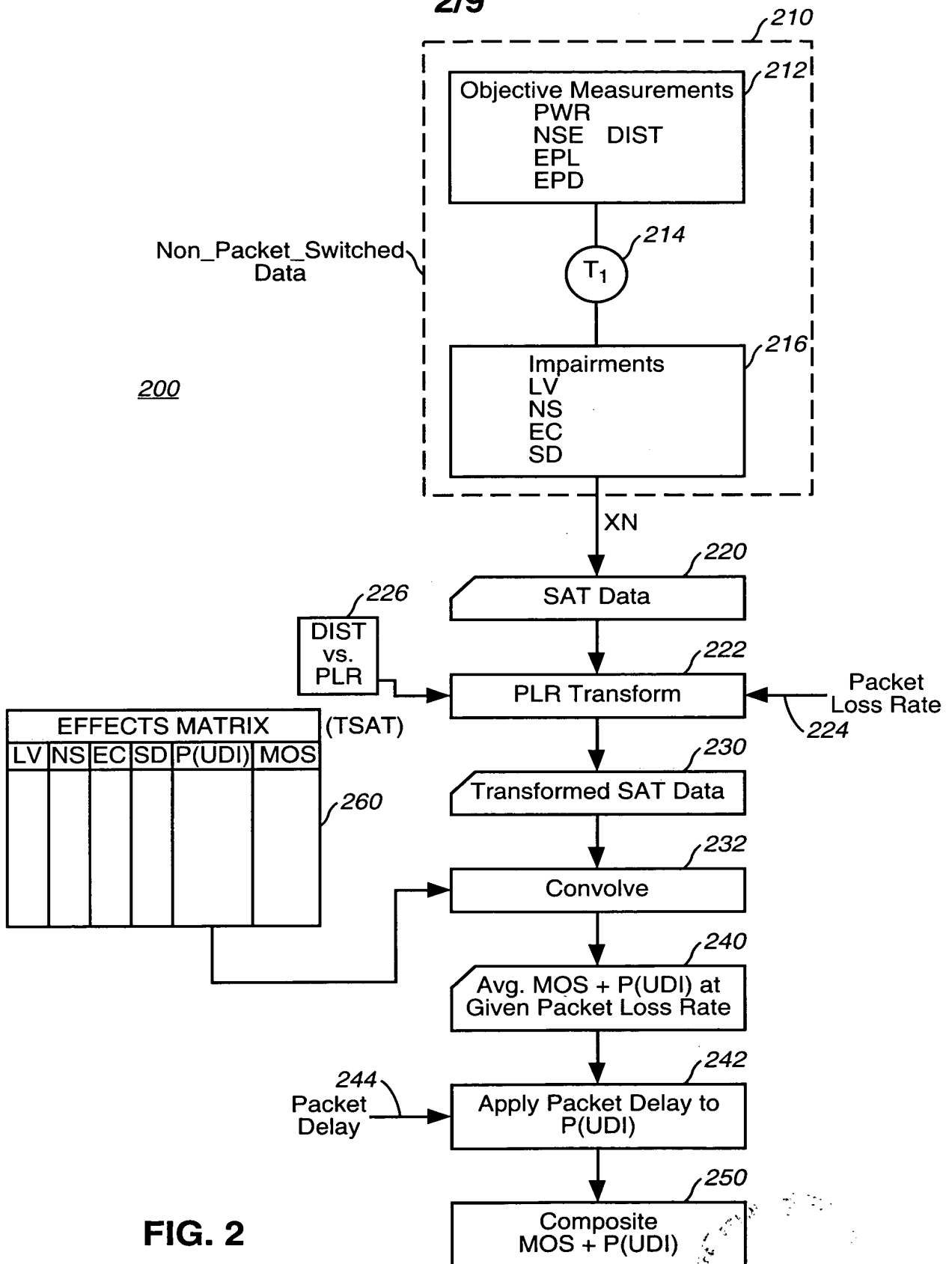
FIG. 4

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500

510

Receiver

520

Measurement
Circuitry

530

Database

540

Computer

550

Output

FIG. 5

Start -
Given Input of Packet Loss Rate and Packet
Delay for Second Communications Service
⟋602

Obtain SAT Data for First Communications Service ⟋604

- Apply TSAT Model to Calculate MOS1 and
  P(UDI)1 for First Communications Service

- Calculate Required MOS and P(UDI) for
  Second Communications Service:

  MOSREQ = MOS1 - 0.2

  P(UDI)REQ = 0.06

⟋606

600

Transform SAT Data to Reflect Influence of
Packet Loss Rate on Perceived Distortion.
⟋608

Apply TSAT Model to Transformed SAT Data
to Derive Worst Case MOS2 and P(UDI)2 for
Second Communications Service.
⟋610

Determine Effect of Packet Delay on P(UDI) -
Subtract from P(UDI)REQ.
⟋612

Calculate Maximum Proportion of MOS2 : MOS1
to Result in Average MOS >= MOSREQ.
⟋614

Calculate Maximum Proportion of P(UDI)2 : P(UDI)1
Resulting in Average P(UDI) <= P(UDI)REQ.
⟋616

Select Lesser of:
- Maximum Proportion Based on MOS
- Maximum Proportion Based on P(UDI)
⟋618

Output Selected Proportion as Maximum Allowed for
Second Communication Service to be Perceived
with Same Quality as First Communication Service
⟋620

Done Processing One Packet Loss Rate
and Packet Delay Combination
⟋622

FIG. 6

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Title   Method and System for Evaluating the Quality
               of Packet-Switched Voice Signals

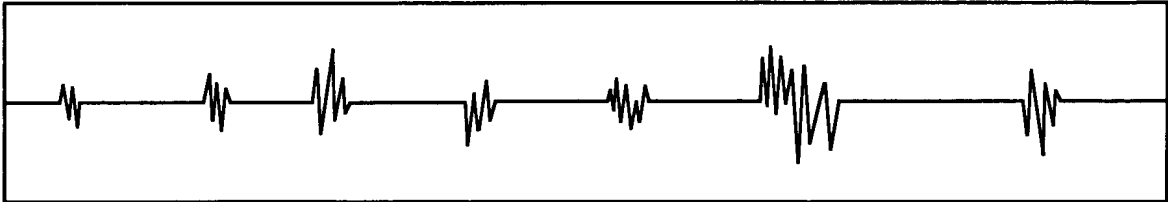Inventors: W. Hardy

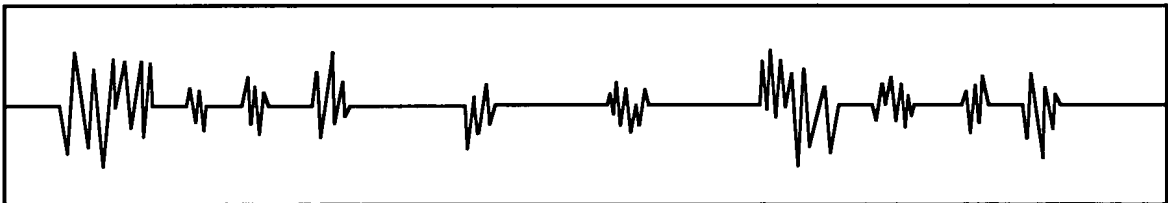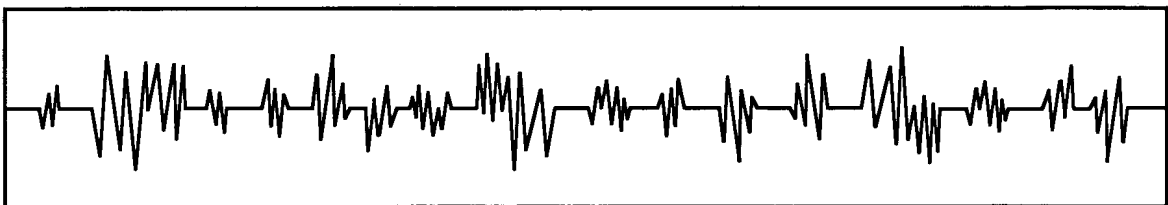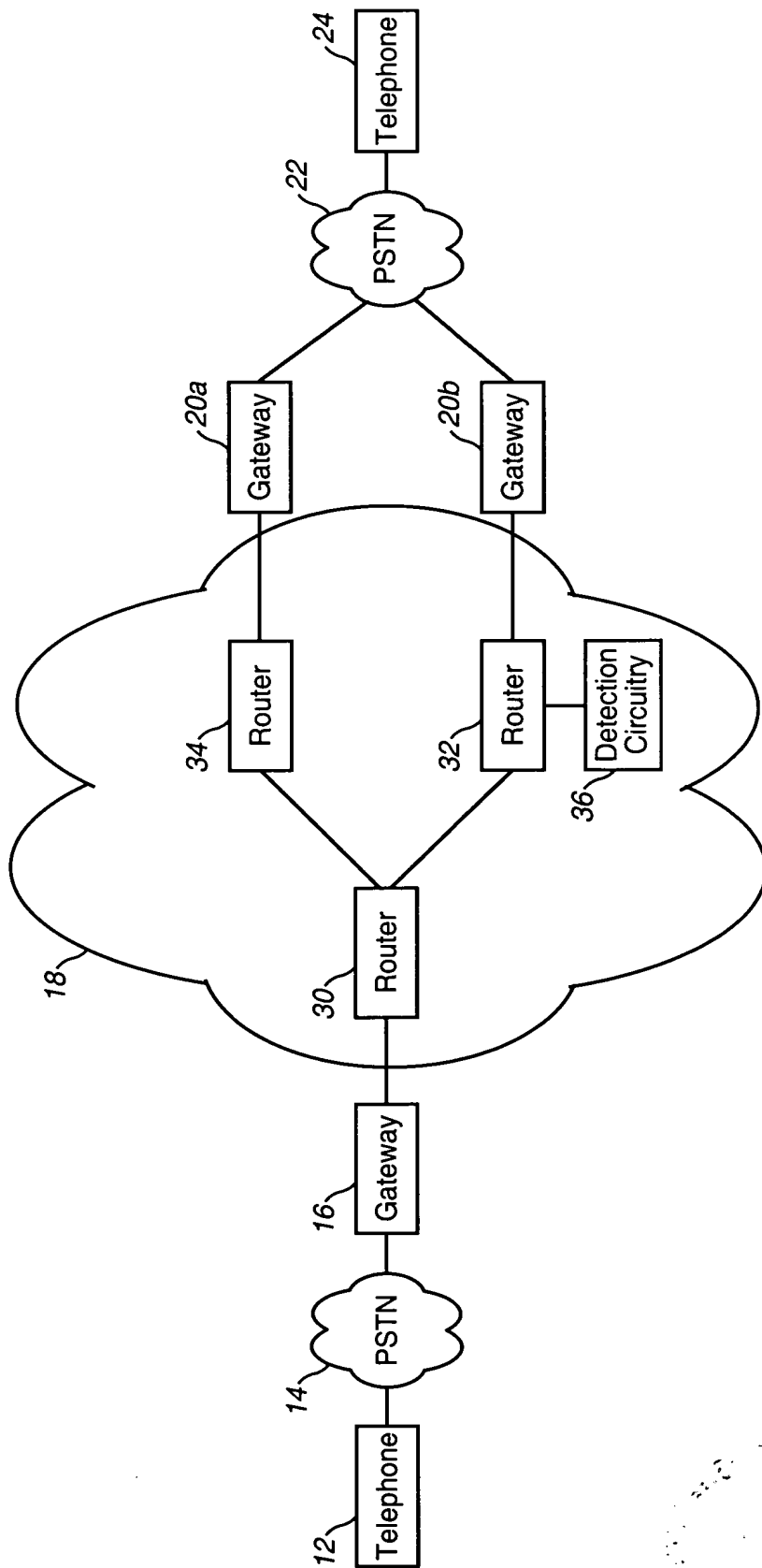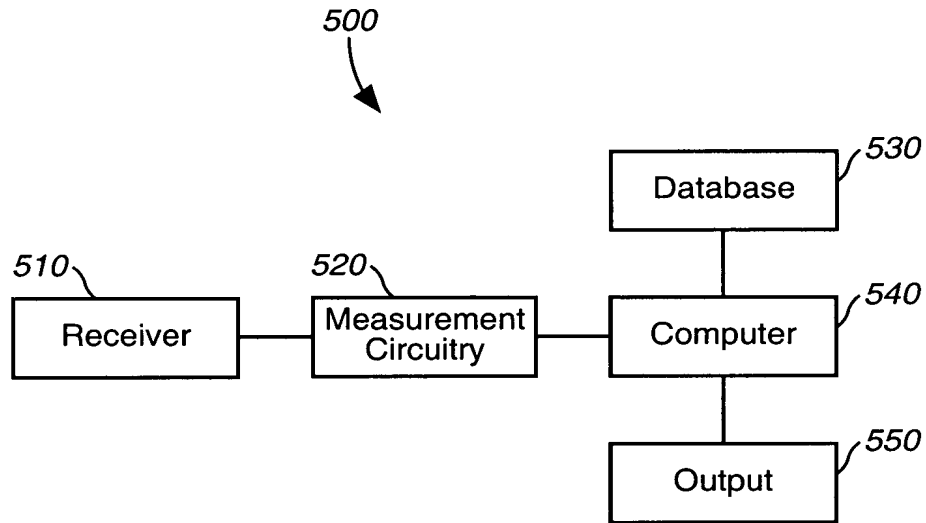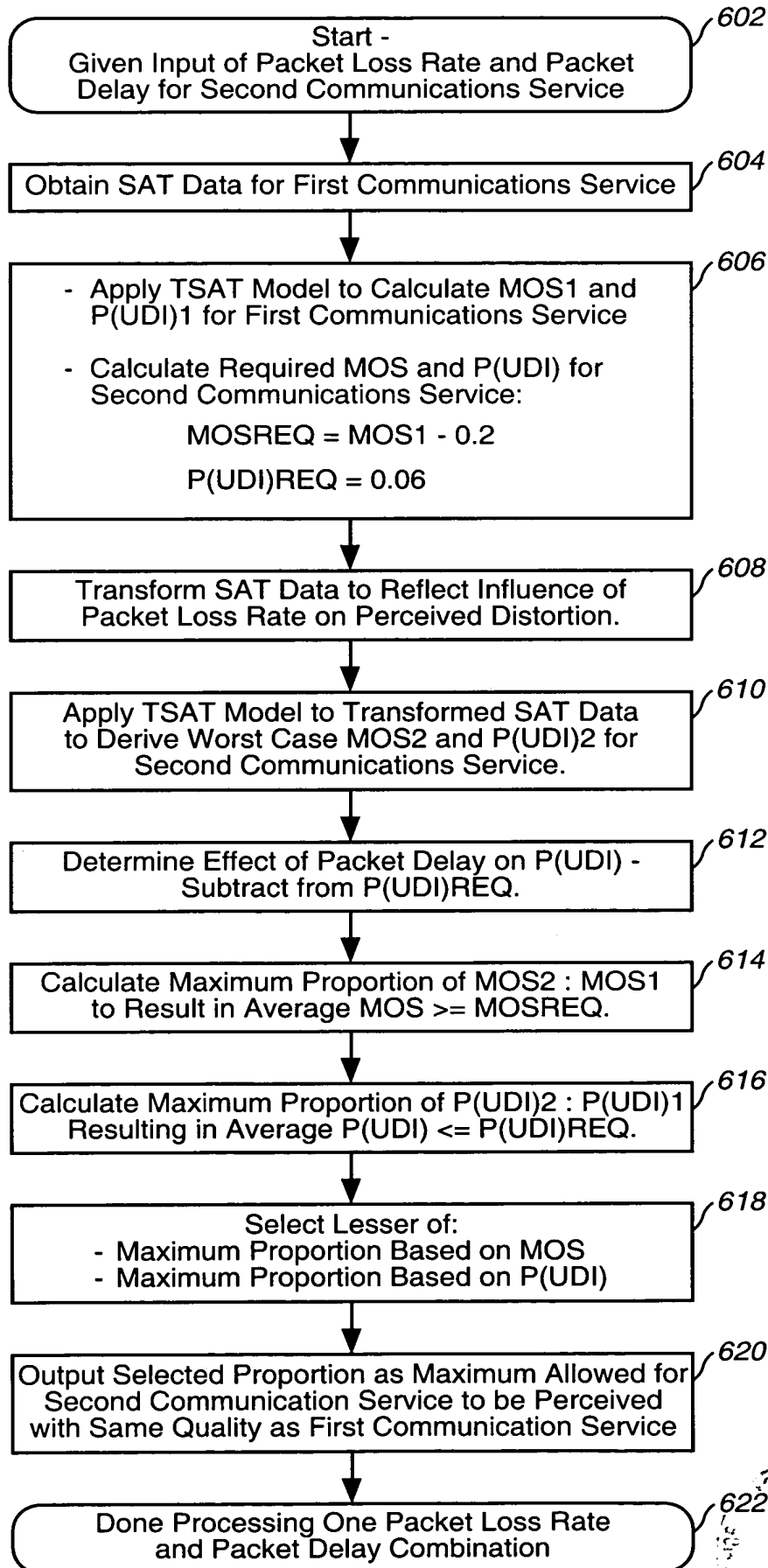Sheets of Drawings: 7   of   9

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               ┌─────────────────────────────────────┐
               │            Start -                   │  ╱702
               │  Given Packet Loss Rate as Input     │
               └─────────────────────────────────────┘
                                │
                                ▼
               ┌─────────────────────────────────────┐
               │         Obtain SAT Data              │  ╱704
               └─────────────────────────────────────┘
                                │
                                ▼
               ┌─────────────────────────────────────┐
               │  Select Set of Three Quadragrams     │  ╱706
               │  Wherein Speech Distortion Varies    │
               │  While Remaining Characteristics     │
               │  Have a Fixed Pattern.               │
               └─────────────────────────────────────┘
                                │
                                ▼
               ┌─────────────────────────────────────┐
               │  From SAT Data, Look Up Proportions  │  ╱708
               │  for Each of the Selected            │
               │  Quadragrams as Speech Distortion    │
               │  Varies None-Some-Much (Cn,Cs,Cm)    │
               └─────────────────────────────────────┘
                                │
                                ▼
               ┌─────────────────────────────────────┐
               │  From Table of Perceived Speech      │  ╱710
               │  Distortion as a Function of Packet  │
               │  Loss Rates, Look Up Relative        │
               │  Proportions of None-Some-Much       │
               │  (Pn,Ps,Pm) for the Given Packet     │
               │  Loss Rate.                          │
               └─────────────────────────────────────┘
                                │
                                ▼
               ┌─────────────────────────────────────┐
               │  Alter Occurrence Frequencies for    │  ╱712
               │  Each of the Selected Quadragrams    │
               │  as Follows:                         │
               └─────────────────────────────────────┘
```

Alter Occurrence Frequencies for Each of the Selected Quadragrams as Follows:

$$Cn' = Cn - Cn(Ps + Pm)$$

$$Cs' = Cs + (Cn)(Ps) - Cs(0.5Ps + Pm)$$

$$Cm' = Cm + (Cn)(Pm) + Cs(0.5Ps + Pm)$$

700

714

All Quadragrams Processed?

716

Output SAT Data as Transformed for Given Packet Loss Rate

718

Done

FIG. 7

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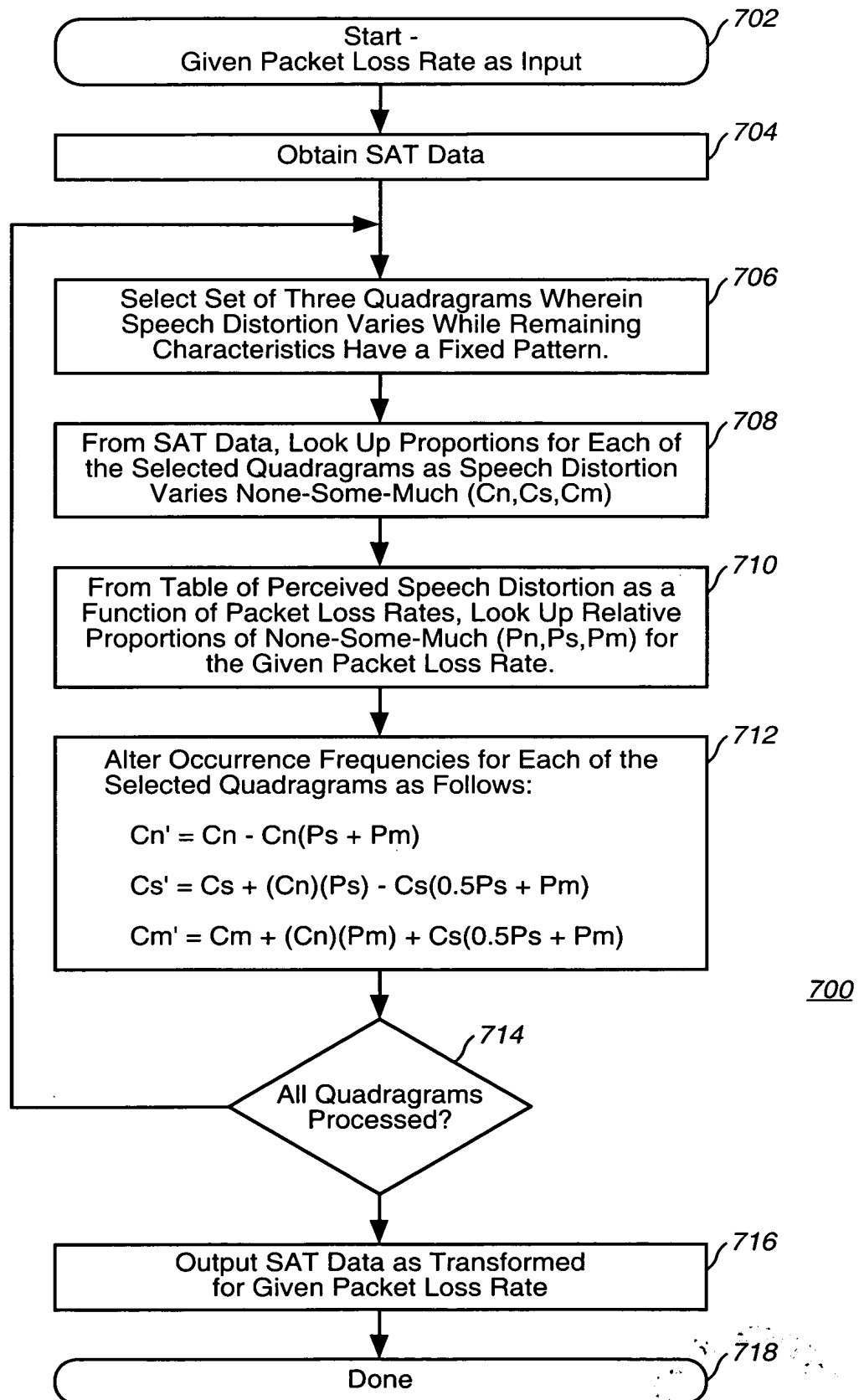
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          of Packet-Switched Voice Signals
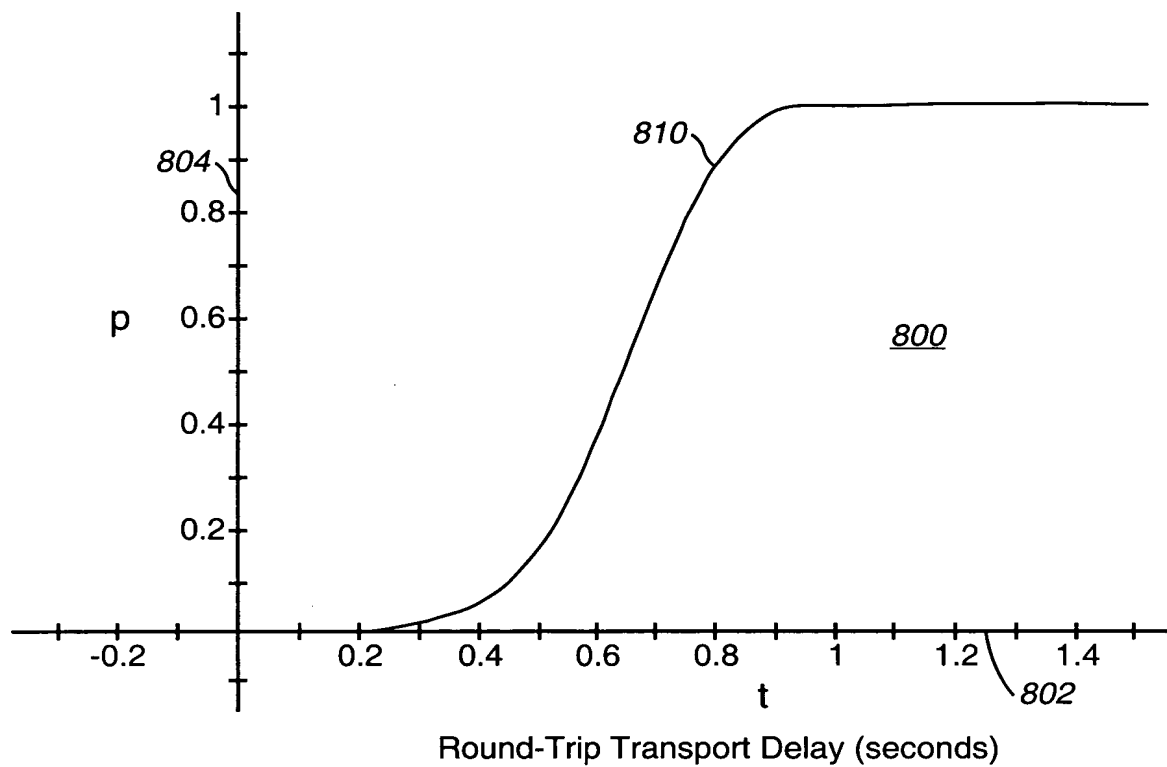
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Round-Trip Transport Delay (seconds)

FIG. 8

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Sheets of Drawings: _____9_____ of _____9_____

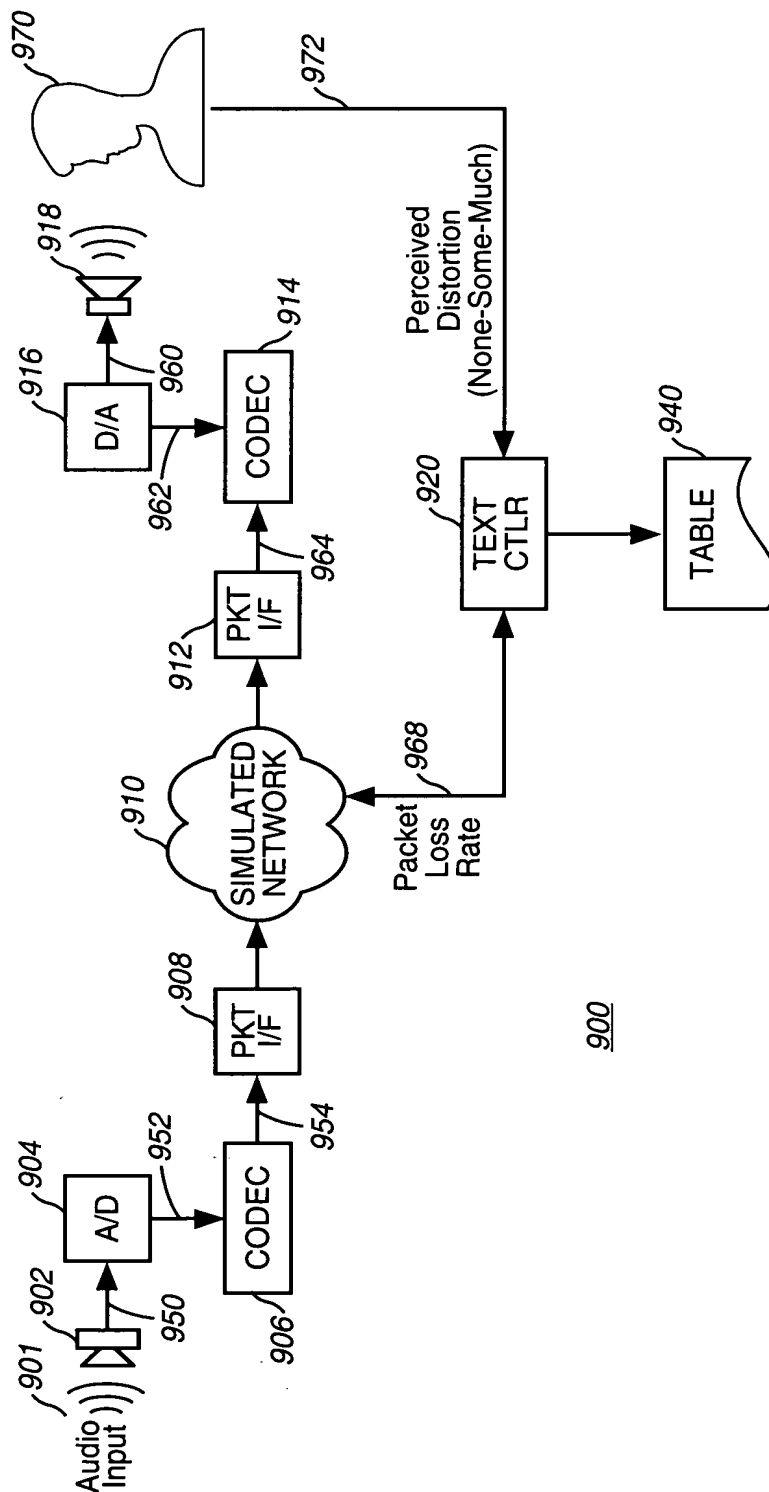9/9

FIG. 9